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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/852,090	05/10/2001	Hirokazu Yamagata	12732-037001	5147

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FISH & RICHARDSON P.C.
1425 K STREET, N.W.
11TH FLOOR
WASHINGTON, DC 20005-3500

EXAMINER

CLEVELAND, MICHAEL B

ART UNIT	PAPER NUMBER
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1762

DATE MAILED: 11/06/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.		Applicant(s)	
	09/852,090		YAMAGATA ET AL.	
	Examiner		Art Unit	
	Michael Cleveland		1762	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 September 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-102 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-102 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Interpretation

1. Based on Applicant's comments on pp. 19-20 of the response, the terms "instantaneously starting" and "instantaneously stopping" in new claims 35-68 have been interpreted as contrasting to the method suggested by Peng and Shi of gradually increasing or decreasing the dopant concentration to produce a blurred heterojunction.
2. The term "goggle type display" in the claims is interpreted in light of the specification in accordance with p. 12 as referring to any head mounted display. The term "notebook type personal computer" is not defined in the specification but appears to include any portable personal computer. For purposes of applying art, the terms have been interpreted as described in this section.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.
4. Claims 1-102 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

There is no disclosure in the originally filed specification of a method which comprises producing a thin film comprising an organic material and a dopant with constant evaporation rates of the organic material and the dopant, as claimed in amended claims 1-34.

There is no disclosure in the originally filed specification of a method which comprises producing a thin film comprising an organic material and a dopant and another comprising the organic material by instantaneously starting or stopping (as opposed to gradually starting or stopping) the evaporation of the dopant while continuing evaporation of the organic material, as claimed in amended claims 35-68.

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There is no disclosure in the originally filed specification of a method which comprises producing a thin film comprising an organic material and a dopant with a constant concentration of the dopant along the depth direction, as claimed in amended claims 69-102.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of Kobori '039 is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

6. Claim 2, 4, 12, 14-15, 17, 20, 22, 70, 72, 80, 82-83, 85, 88, and 90 are rejected under 35 U.S.C. 102(b) as being anticipated by Xie et al. (U.S. Patent 5,989,737). (Motomatsu (U.S. Patent 6,541,909, hereafter '909) is cited as evidence regarding claims 70 and 72.)

'737 teaches a method of manufacturing a light emitting device, comprising the steps of forming a first thin film (the first 30 nm thickness of the film described at col. 14, lines 13-20) comprising tris(8-hydroxyquinolate)aluminum (also known as Alq or Alq3), an organic luminous material (see specification, p. 2, lines 1-11) (as well as a dopant) by evaporation; and

forming a second thin film (the remaining 30 nm thickness of the film described at col. 14, lines 13-20) comprising the organic material and a dopant by evaporating the dopant while continuing the evaporation of the organic material with constant evaporation rates of the organic material (0.6 nm/s) and the dopant (0.09 nm/s).

Claims 70, 72: '909 teaches that the concentration of a dopant in a vapor deposited layer is controlled by the relative vapor deposition rates of the dopant and the host (col. 4, lines 15-17). Therefore, because the deposition rates of Alq and the dopant are constant in '737, the concentration of the dopant must be uniform across the depth of the layer.

Claims 12, 14, 80, 82: '737 teaches depositing a metallic film on the second thin film (col. 14, lines 21-29).

Claims 15, 17, 83, 85: The organic material is Alq, as discussed above.

Claims 20, 22, 88, 90: The dopant is fluorescent (col. 14, line 17).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 1, 7, 35, 41, 69, and 75 are rejected under 35 U.S.C. 103(a) as being unpatentable over Motomatsu (U.S. Patent 6,541,909, hereafter '909) in view of Xie et al. (U.S. Patent 5,989,737, hereafter '737).

Claim 69: '909 teaches a method of manufacturing a light emitting device comprising:
forming a layer (5a) by

forming a first thin film (7 in Fig. 2 or 4 in Fig. 4) comprising an organic material and a dopant (col. 4, lines 8-12; col. 5, lines 44-57) by vapor deposition (col. 5, lines 50-52), and

forming a second film (the portion of 5a between layers 7 and 6 in Fig. 2 or layer 5b in Fig. 4) made of the organic material without the dopant (col. 4, lines 12-15, col. 5, lines 56-57), wherein the concentration of the dopant along a depth direction in the first film (7, between p and

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q) is constant (Fig. 5-1; col. 6, lines 29-30). The concentration of the dopant is determined by the relative rates of vapor deposition (col. 4, lines 15-17). Therefore, to produce a layer without dopant, the vapor deposition of the dopant must be stopped.

'909 does not explicitly state A) that the vapor deposition occurs by evaporation, nor B) that the second film is produced by stopping evaporation of the dopant while continuing evaporation of the organic material.

A) The examiner takes Official Notice that evaporation is a notoriously well known method of vapor depositing the organic luminescent material and dopant of light-emitting devices. See, e.g., '737, col. 14, lines 3-20. The selection of something based on its known suitability for its intended use has been held to support a *prima facie* case of obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). See MPEP 2144.07. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used evaporation as the particular method of vapor deposition for the organic luminescent and dopant because '737 teaches that evaporation is an operative method of vapor depositing the materials.

B) As stated above, '909 teaches that the concentration of the dopant is determined by the relative rates of vapor deposition of the organic luminescent material and the dopant (col. 4, lines 15-17). Therefore, to produce a layer without a dopant, the evaporation of the dopant must be stopped. Thus, the evaporation of the undoped layer must proceed either 1) by continuing the evaporation or 2) by stopping and restarting the evaporation of the material. '909 does not explicitly state which possibility is used. *Mueller Brass Co. v. Reading Industries* (176 USPQ 361, p. 369) states that in judging the level of ordinary skill in the art, it is the level of those who normally attack the problems of the art that counts; persons who do most of the problem solving in involved art are graduate engineers; as such they are chargeable with general knowledge concerning principles of engineering outside the narrow field involved and with the skills, ingenuity, and competence of the average professional engineer. One of ordinary skill in the art would have understood that stopping and restarting the evaporation of the organic material would necessarily have taken longer than merely continuing the evaporation, and that an increase in the time of production would necessarily have reduced the number of light-emitting devices manufactured per unit time (production rate). Therefore, it would have been obvious to one of

ordinary skill in the art at the time the invention was made to have continued the evaporation of the organic material while stopping the evaporation of the dopant in order to have minimized the process time, and therefore maximized the production rate.

Claim 1: '909 does not explicitly teach that the uniformly doped layer(s) 4 or 7 are deposited at a constant rate. However, because the concentrations are uniform across the deposition depth (Fig. 5-1) and the concentration is controlled by the relative evaporation rates (col. 4, lines 15-17), the ratio between the organic luminescent material and the dopant must remain constant. This ratio must be kept constant either 1) by maintaining the individual rates constant or 2) by varying them such that ratio is always the same. One of ordinary skill in the art would have recognized that maintaining the rates constant would have been the simpler method of maintaining the constant rate, particularly in view of the disclosure of '737, col. 14, lines 13-20, that an entire layer may be deposited with constant rates of the organic luminescent material and the dopant.

Claim 35: '909 teaches that at the junction between layer 7 and the remainder of film 5a (point p), the concentration of dopant jumps from a constant value to zero (col. 4, lines 7-19). '909 teaches varying the relative rates of the host material and the dopant to produce a variety of concentration profiles (Figs. 5-2 through 5-6), including step jumps (Fig. 5-5). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have changed the rate of the dopant from its constant value (as in Fig. 5-1) to zero (i.e., to have instantaneously stopped the evaporation of the dopant) in order to have achieved the desired concentrations of dopant in the layers. It would have been obvious to have instantaneously stopped the flow of the dopant while having continued the evaporation of the host material for the reasons stated above regarding claim 69.

Claims 7, 41, 75: '909 teaches that cathode (6) is deposited on the second layer, but does not teach a particular cathode material. It does teach that any generally known materials may be used (col. 6, line 65-col. 7, line 8). '737 teaches that cathodes for EL devices may be metallic (col. 13, lines 31-38). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a metallic film as the particular cathode of '909 because '737 teaches that metals are operative cathodes for light-emitting devices.

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9. Claim 2-6, 8-9, 12-24, 36-40, 42-43, 46-58, 70-74, 76-77, and 80-92 are rejected under 35 U.S.C. 103(a) as being unpatentable over Motomatsu '909 in view of Xie '737 as applied to claim 1 above, and further in view of Kobori et al. (U.S. Patent 6,285,039, hereafter '039). Ueda et al. (U.S. Patent 6,468,676, hereafter '676) and Maricle et al. (U.S. Patent 3,654,525, hereafter '525) are cited as evidence regarding claims 9 and 20-24.

Reverse deposition (applies to independent claims 2, 4, 6, 36, 38, 40, 70, 72, 74):

Motomatsu '909 and Xie '737 are discussed above. Motomatsu teaches making a light emitting device from anode(2) to cathode (6) by forming a thin film of an organic electron-transporting compound and a dopant followed by forming a thin film of the organic electro-transporting layer alone, as discussed above. The combination fairly suggests instantaneously stopping evaporation of the dopant to produce the second layer for the reasons discussed above.

The references do not teach forming a layer of an organic material by evaporation and then forming a second thin film by instantaneously starting evaporation of the dopant while continuing the evaporation of the organic material. However, the examiner takes Official Notice that it is well known that the layers of light-emitting devices may be deposited from cathode to anode instead of anode to cathode. See, e.g., '039, col. 33, lines 33-35. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have reversed the process described above: depositing a cathode, then evaporating the organic electron-transport layer free of dopant, then the electron-transport layer that comprises the dopant through to the anode with a reasonable expectation of success and with the expectation of similar results because '039 teaches that cathode-to-anode construction is an operable method of constructing light-emitting devices. It would have been obvious to have deposited the dopant by instantaneously starting evaporation of the dopant at the desired concentration while continuing the evaporation of the organic material to have maximized production rate for reasons analogous to the discussion of "instantaneously stopping" above.

Claims 12, 14, 46, 48, 80, 82: In the cathode-to-anode deposition, the anode is deposited on the organic films. '737 teaches that the anode may be metallic (col. 13, lines 45-49).

Two luminescent films (applies to independent claims 3-6, 37-40, 71-74):

'909 explicitly teaches two embodiments: Fig. 2, which comprises a layer (5a) comprising a layer (7) of an electron-transporting material and a dopant and another layer (between 7 and 6) of an electron-transporting material without a dopant, and Fig. 4, which comprises a light emitting layer (4) comprising a dopant and an electron-transporting layer (5b) without a dopant. '909 does not identify specific light-emitting or electron-transport materials, but suggests that any generally known materials may be used (col. 6, line 65-col. 7, line 8). Therefore, it does not explicitly teach forming a layer of a luminous material and a dopant followed by forming a layer of the luminous material alone.

However, reference example 2 of '039 (col. 559) teaches forming a light-emitting device by

forming a layer by co-evaporating Alq (an organic luminous material) and TPD005 and rubrene (dopants) as the light-emitting layer of an electroluminescent (EL) device (col. 559, lines 44-50)

forming a layer of Alq alone as an electron-transporting and light-emitting layer on top of the Alq/TPD005/rubrene layer (col. 559, lines 51-54).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used Alq as the particular light-emitting material of layer (4) or the particular electron-transporting material of layer (7) with a reasonable expectation of success because '039 teaches that Alq is an operative light-emitting and electron-transporting material, and further explicitly demonstrate an embodiment with a first layer of Alq and a dopant and a second, adjacent layer of Alq alone.

Claims 5, 6, 39, 40, 73, 74: Alq is a green luminescent material (see '039, col. 2, lines 18-25 or current specification, p. 2, lines 1-11). The Alq/TPD005/rubrene layer appears to be a yellow layer ('039, col. 559, lines 60-62). However, '039 also teaches that colors of light ranging from blue to red are of interest (col. 1, lines 19-23, col. 2, lines 16-48) and that there are known dopants to produce red layers (col. 33, lines 36-47), including Alq3 doped with red dyes, such as P-660 or DCM1 (col. 2, lines 23-25). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a red Alq/DCM1 or Alq/P-660 to have produced a red layer instead of a yellow layer because '039 teaches that red

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EL devices are of interest in the art and that Alq doped with DCM1 or P-660 is known to produce red layers.

Claim 8, 15-19, 42, 49-53, 76, 83-87: As described above, the host material may be Alq.

Claim 9, 20-24, 43, 54-58, 77, 88-92: Rubrene is a fluorescent organic material. (See '525, col. 5, lines 40-45.) Regarding claims 23 and 24, DCM1 is also an organic fluorescent material. (See '676, col. 34, lines 18-35).

Claim 13, 47, 81: During anode-to-cathode deposition, '737 teaches that the cathode may be metallic, as discussed above regarding claim 7.

10. Claims 10, 25-29, 44, 59-63, 78, and 93-97 are rejected under 35 U.S.C. 103(a) as being unpatentable over Motomatsu '909 in view of Xie '737 and Kobori '039, as applied to claims 2-6, above, and further in view of Singh et al. (U.S. Patent 6,228,228, hereafter '228). Thompson et al. (U.S. Patent 6,413,656, hereafter '656) is cited as evidence.

'909, '737, and '039 are discussed above. They do not teach that the dopant in the red layer is phosphorescent.

However, '228 demonstrates that red light-emitting layers may be formed by doping Alq with PtOEP (col. 10, lines 26-33). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used PtOEP as a dopant to form a red EL layer instead of DCM1 or P-660 as disclosed by '039 with a reasonable expectation of success and with the expectation of similar results because '228 demonstrates the art recognized suitability of Alq/PtOEP layers as red EL layers, and the selection of a known material based on its suitability for its intended use has been held to support a *prima facie* case of obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). See MPEP 2144.07. '656 teaches that PtOEP is phosphorescent (col. 4, lines 18-22).

11. Claims 11, 45, and 79 are rejected under 35 U.S.C. 103(a) as being unpatentable over Motomatsu '909 in view of Xie '737, as applied to claims 1, above, and further in view of Yamada et al. (U.S. Patent 6,215,462, hereafter '462).

'909, and '737 are discussed above. They discuss some uses of the EL devices (e.g., '909 teaches that the devices are used in organic EL displays (col. 7, lines 9-10) and '737 teaches flat-

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panel display, such as TV screens, computer screens, and the like (col. 1, lines 47-52), but they do not specifically teach that the EL device is incorporated into a video camera, digital camera, goggle display, car navigation system, sound reproduction system, notebook PC, game apparatus, portable information terminal or image playback device.

'462 teaches that organic EL devices are useful as the displays in the image playback portions of cameras (col. 4, lines 46-60). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have incorporated the EL device of '909 and '737 into an image playback device with a reasonable expectation of success because '462 teaches that organic EL devices may be used in image playback devices (i.e., a specific organic EL display device).

12. Claims 30-34, 64-68 and 98-102 are rejected under 35 U.S.C. 103(a) as being unpatentable over Motomatsu '909 in view of Xie '737 and Kobori '039, as applied to claims 2-6, 36-40 above, and further in view of Yamada '462, for the reasons given above regarding claim 11.

13. Claims 30, 32, 98 and 100 are rejected under 35 U.S.C. 103(a) as being unpatentable over Xie '737, as applied to claims 2 and 4, above, and further in view of Yamada '462, for substantially the reasons given above regarding claim 11.

Response to Arguments

14. Applicant's arguments with respect to claims 1-102 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

15. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

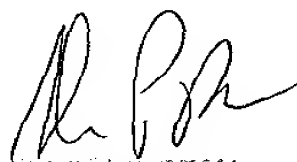
16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Cleveland whose telephone number is (703) 308-2331. The examiner can normally be reached on 8-5:30 M-F, with alternate Mondays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive Beck can be reached on (703) 308-2333. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 306-3186 for regular communications and (703) 306-3186 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.



Michael Cleveland
Patent Examiner
October 30, 2003



SHRIVE P. BECK
SUPERVISORY PATENT EXAMINER
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